

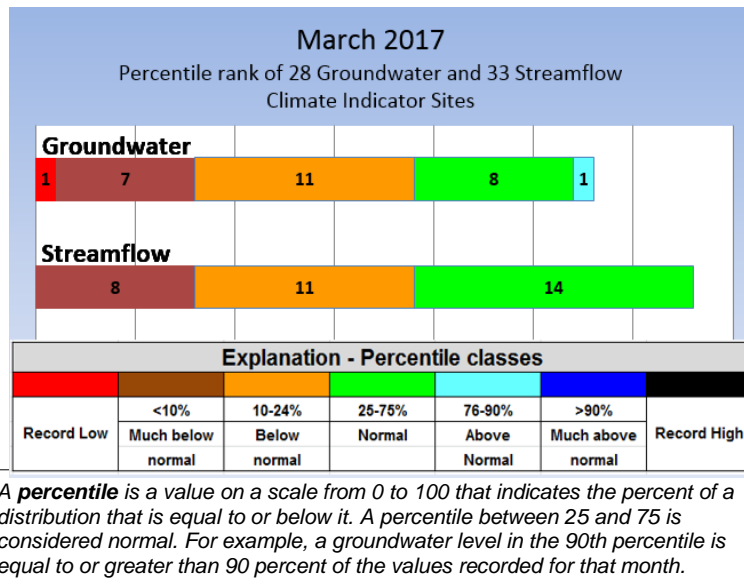
# U.S. Geological Survey (USGS) Maryland-Delaware-District of Columbia Monthly Water Conditions Summary

## USGS March 2017 Water Conditions Summary

In March 2017, at sites used to monitor the response of water resources to changes in weather conditions in Maryland, Delaware, and the District of Columbia, 68 percent of groundwater levels and 58 percent of monthly mean streamflows were below normal. Rain on the last day of the month helped to increase groundwater levels the last day of the month which may affect their ranking. The groundwater level at an observation well in Montgomery County, Maryland was at a record monthly low for the second consecutive month. In March, groundwater levels decreased at 7 wells, increased at 20 wells, and remained unchanged at 1 well, whereas monthly mean streamflows increased at all 33 streamgages.

In March, groundwater levels at 8 of 28 USGS observation wells were in the normal range (25<sup>th</sup>-75<sup>th</sup> percentiles). Groundwater levels were below normal at 19 wells, with 7 wells below the 10<sup>th</sup> percentile and one well at a record March low. One well had above normal groundwater levels.

Monthly mean streamflows were in the normal range at 14 of 33 selected USGS streamgages. Streamflow was between the 10<sup>th</sup> and 24<sup>th</sup> percentiles at 11 streamgages, and below the 10<sup>th</sup> percentile at 8 streamgages. Freshwater flows to the Chesapeake Bay were in the below normal range. Hydrologic and weather data have not been reviewed, and are therefore provisional and subject to revision.



## Why is it important for the USGS to collect and analyze water-resources data?

USGS water data are valuable to the public, researchers, water managers, planners, and agricultural users, especially during extreme conditions like floods and droughts. The USGS is known for its consistent measurement techniques and the most extensive set of historical groundwater and streamflow data available to the public. Since these long-term data were collected during wet and dry periods, they can be used to assess how water resources respond to changes in temperature and precipitation, and to evaluate how current data compare to the historical data. The uniformity of the dataset enables multi-state comparisons and other comparative statistical analyses that better inform policy makers of possible water-resources conditions they might encounter in the future.

The sites used in this water summary were carefully selected to include long-term datasets, and show the response of streamflow and groundwater levels to weather conditions, rather than the effects of human influences. Of the USGS sites presented in this summary, 13 wells and 29 streamgages have more than 50 years of data. The current streamflow and groundwater data are ranked in comparison to the historical record and summarized. In addition to groundwater and streamflow data, this summary includes precipitation and temperature data, reservoir levels, and freshwater streamflow to the Chesapeake Bay to give a more complete picture of the region's water resources.

# U.S. Geological Survey (USGS) Maryland-Delaware-District of Columbia Monthly Water Conditions Summary

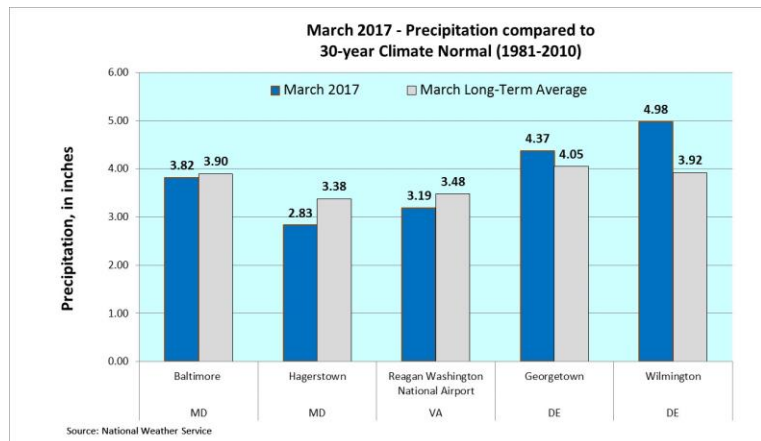
## Weather Conditions

Data from five Mid-Atlantic National Weather Service (NWS) stations are used to present monthly precipitation and temperature data. The NWS uses averages of data over the 30-year climate normal period between 1981 and 2010. During drought periods, the status from the National Drought Mitigation Center (U.S. Drought Monitor) is included.

## March 2017 Precipitation

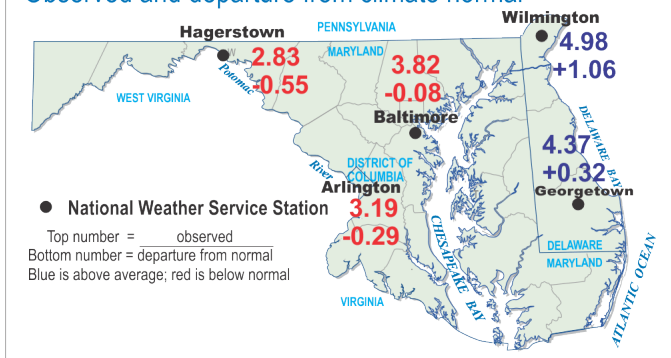
March precipitation was below normal at three Mid-Atlantic National Weather Service (NWS) weather stations in Maryland and above normal at the two weather stations in Delaware.

The precipitation map shows the March precipitation and the departure from climate normal as red text for below normal and blue text for above normal. Precipitation was lowest in Hagerstown, Maryland with 2.83 inches and highest in Wilmington, Delaware with 4.98 inches.



## March 2017 Precipitation (inches)

Observed and departure from climate normal



## National Weather Service Stations

**Baltimore =**

Baltimore/Washington International  
Thurgood Marshall Airport (BWI)

**Georgetown =**

Georgetown, Sussex County Airport

**Hagerstown =**

Hagerstown Regional Airport

**Arlington =**

Ronald Reagan Washington National Airport

**Wilmington =**

New Castle Airport

Source: National Weather Service

MD and DC: <http://www.weather.gov/climate/index.php?wfo=lmw>

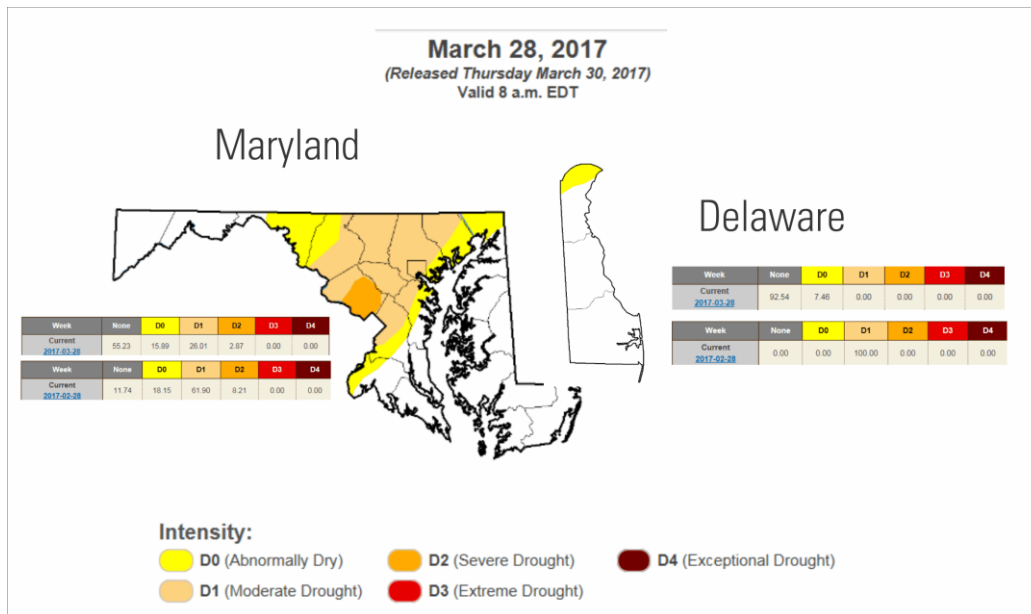
DE: <http://www.weather.gov/climate/index.php?wfo=phi>

MARFC: [http://www.weather.gov/marfc/Precipitation\\_Departures](http://www.weather.gov/marfc/Precipitation_Departures)

# U.S. Geological Survey (USGS) Maryland-Delaware-District of Columbia Monthly Water Conditions Summary

## Drought Status

According to the U.S. Drought Monitor, as of March 28, 2017, 28.88 percent of Maryland was in drought status (D1 and D2), which is much less than at the end of February, when 70.11 percent was in drought status. In Maryland, 2.87 percent was in the D2 or severe drought category in Montgomery County. The D2 drought category for Maryland was 8.21 at the end of February. The Delmarva Peninsula, which includes all of Delaware, is no longer in drought status. On the drought map, the values at the end of February and March are shown in tables for comparison.



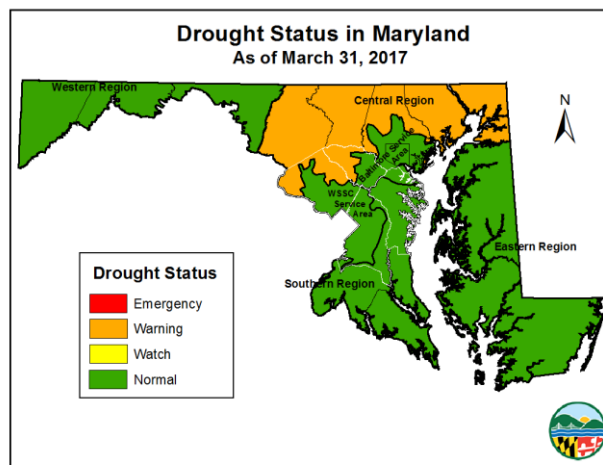
For the most recent drought status, visit: <http://droughtmonitor.unl.edu/Home/RegionalDroughtMonitor.aspx?northeast>

As of the end of March, the Maryland Department of the Environment had declared a drought warning in central Maryland.

<http://www.mde.state.md.us/programs/Water/DroughtInformation/Pages/Water/Drought/index.aspx>

## March 2017 Temperatures

March temperatures at the Mid-Atlantic NWS stations ranged from 41.6 degrees Fahrenheit in Wilmington, Delaware, to 47.2 degrees Fahrenheit in Arlington, Virginia near the District of Columbia.. Temperatures were less than a degree above average in Baltimore and Hagerstown in Maryland, and Georgetown, Delaware. In Arlington, Virginia and Wilmington, Delaware, temperatures were below normal with the largest departure from average (1.4 degrees) at the NWS weather station in Wilmington, Delaware.



# U.S. Geological Survey (USGS) Maryland-Delaware-District of Columbia Monthly Water Conditions Summary

## Groundwater

The USGS monitors groundwater levels in surficial or unconfined aquifers, providing observations that can be compared to both short-term and long-term changes in weather conditions. The groundwater wells used for the monthly water summary were selected based on the following criteria:

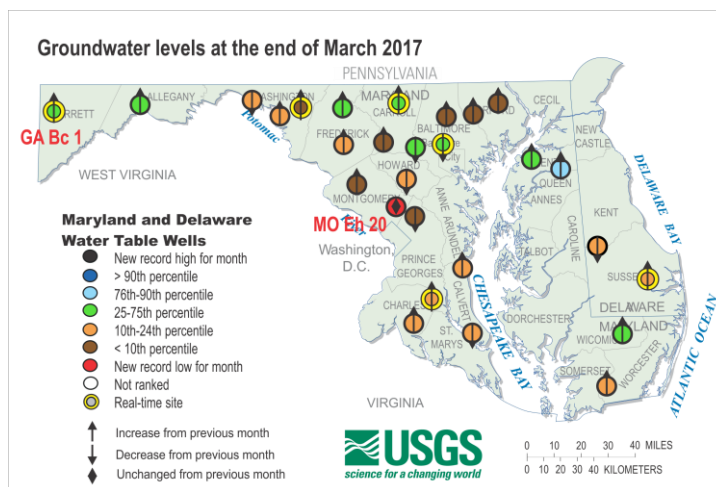
- Located in a surficial or unconfined (water-table) aquifer
- Open to a single, known hydrogeologic unit/aquifer
- Groundwater hydrograph generally reflects response to weather
- No indicated nearby pumpage, and likely to remain uninfluenced by pumpage or changes related to human activities
- Minimum period of record is 10 years of continuous/monthly records
- Minimally affected by irrigation, canals, drains, pipelines, and other potential sources of artificial recharge
- Well has a casing – dug wells are generally not used
- Water levels show no apparent hydrologic connection to nearby streams
- Well rarely goes dry
- Long-term accessibility likely, such as on public land

In the Maryland, Delaware, and District of Columbia region, it is useful to compare current data to data collected during the historical droughts of 2002 and the 1960s. There are 11 wells that have over 60 years of groundwater data, which allows comparison to both of these drought periods. Of the 28 USGS observation wells used for this summary, 23 have more than 30 years of groundwater data as of 2017.

## March 2017 Groundwater Levels

Between February and March, groundwater levels decreased at 7 of 28 wells and increased at 20 wells. The March groundwater level at MO Eh 20 in Montgomery County, Maryland was unchanged since February and at a record low for the second consecutive month. On the groundwater map, arrows on the well symbol indicate whether the groundwater level increased, decreased, or was unchanged since the past month. Some of the wells were measured prior to the precipitation on the last day of March.

At eight USGS observation wells, the groundwater levels were within the normal range. Groundwater levels were below normal at 19 wells, in the 10<sup>th</sup>-24<sup>th</sup> percentiles at 11 wells, below the 10<sup>th</sup> percentile at 7 wells, and a record low at 1 well. Groundwater levels were above normal at the observation well in Queen Anne's County, Maryland. Many of the low groundwater levels were in central Maryland, which is consistent with the current drought status reported by the U.S. Drought Monitor.

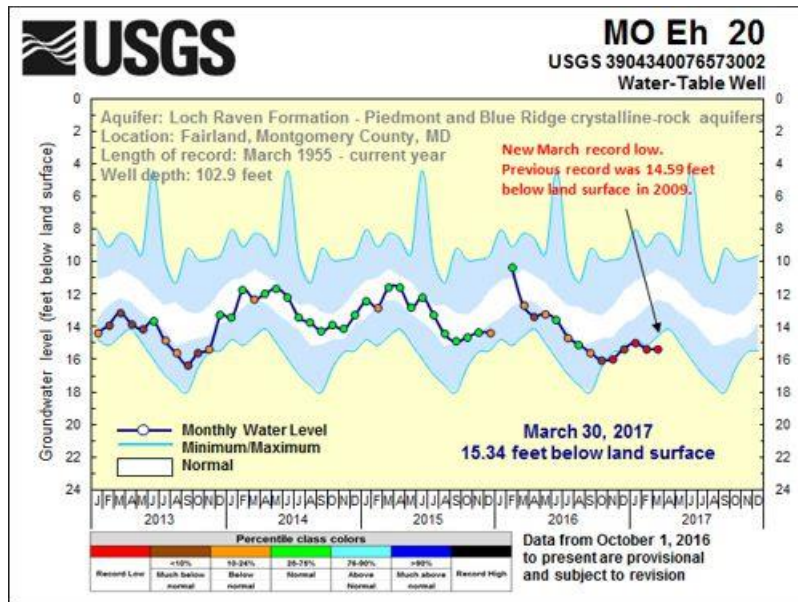


To access the clickable groundwater map, go to:  
[http://md.water.usgs.gov/groundwater/web\\_wells/current/water\\_table/counties/](http://md.water.usgs.gov/groundwater/web_wells/current/water_table/counties/)

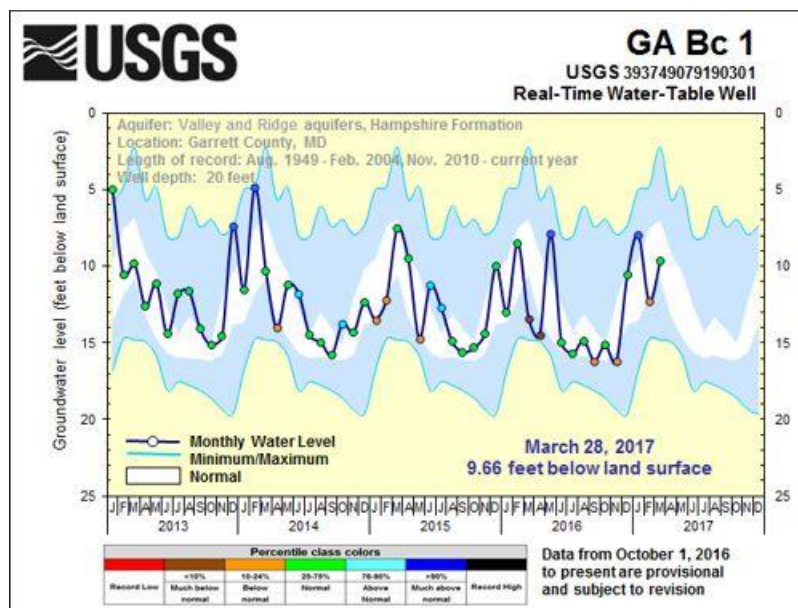


## U.S. Geological Survey (USGS) Maryland-Delaware-District of Columbia Monthly Water Conditions Summary

In the two 5-year hydrographs presented below, groundwater levels are shown as a dark blue line. Each monthly measurement is colored according to the percentile rank compared to the historical values at the site for the month. The normal range is displayed as a white band, and is based on the period of record. The maximum water level is at the top of the upper blue section, and the minimum water level is at the bottom of the lower blue area in the graph.



The groundwater level at USGS observation well MO Eh 20, in Montgomery County, Maryland has been below normal for the last 7 consecutive months and set a record March low at 15.34 feet below land surface. The March 2017 groundwater level exceeded the March record low from 2009 by 0.75 feet. Normal March groundwater levels at this well range from 10.48 to 12.34 feet below land surface.



The groundwater level at observation well GA Bc 1, in Garrett County, Maryland went from below normal in February to normal in March. Normal March groundwater levels at this well range from 7.05 to 10.71 feet below land surface.

Five-year groundwater hydrographs can be viewed at:  
[http://md.water.usgs.gov/groundwater/web\\_wells/current/water\\_table/counties](http://md.water.usgs.gov/groundwater/web_wells/current/water_table/counties)

# U.S. Geological Survey (USGS) Maryland-Delaware-District of Columbia Monthly Water Conditions Summary

## Streamflow

Streamflow data are used most commonly for assessing water supply and to determine the risk of droughts and floods. Streamflow data are also used to calculate loads of chemical constituents, and to assess how biological communities are affected by hydrologic conditions.

The USGS streamgages chosen for the monthly water summary were selected based on the following criteria:

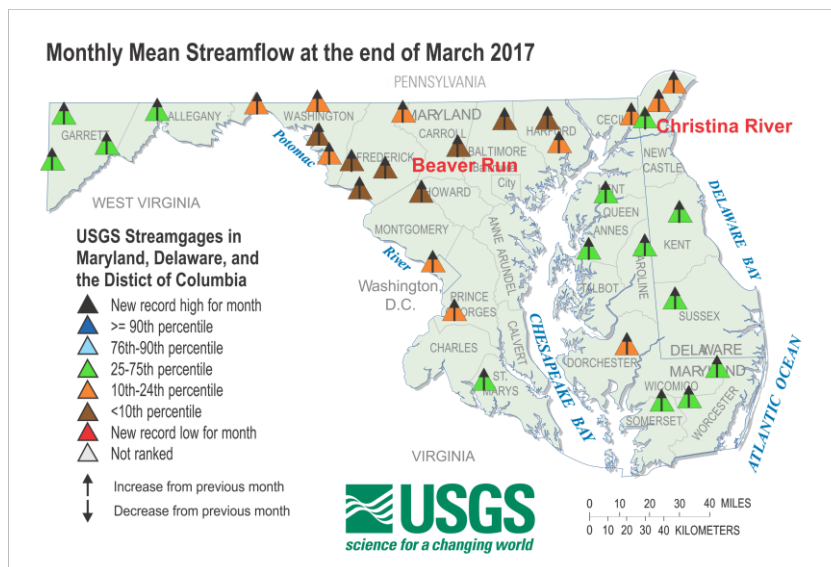
- Minimum period of record is 10 years of continuous data
- Watershed areas greater than 5 square miles
- Streamflow is not regulated, such as by a dam or diversion, and it has relatively natural flow
- Streamflow data reflect a response to weather conditions
- Most of the surrounding area and watershed are not urban

Of the 33 streamgages used in this summary, 22 have more than 60 years of data, allowing for comparison to the historical droughts of 2002 and the 1960s. All 33 streamgages have at least 30 years of monthly mean streamflow data.

## March 2017 Streamflow

Streamflow increased at all of the 33 streamgages used to monitor response to weather conditions in Maryland, Delaware, and the District of Columbia between February and March. On the streamflow map, arrows on the streamgage symbols indicate that all monthly mean streamflows increased over the past month.

Monthly mean streamflows were in the normal range at 42 percent or 14 of 33 selected USGS streamgages. Streamflow at the remaining 19 streamgages was below normal with 11 streamflows between the 10<sup>th</sup> and 24<sup>th</sup> percentiles, and 8 streamflows in the less than 10<sup>th</sup> percentile. The lowest streamflows were in central Maryland and northern Delaware, which corresponds to the drought status reported by the U.S. Drought Monitor.

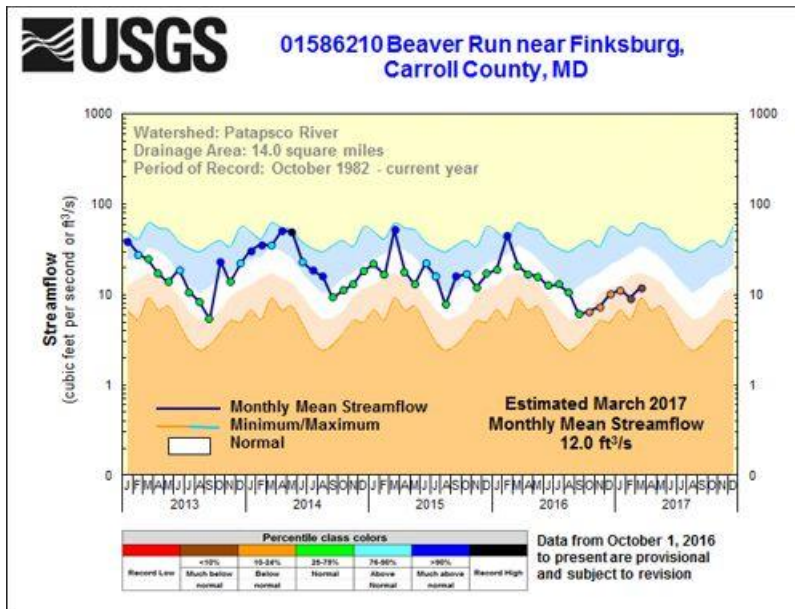


To access the clickable groundwater map, go to:

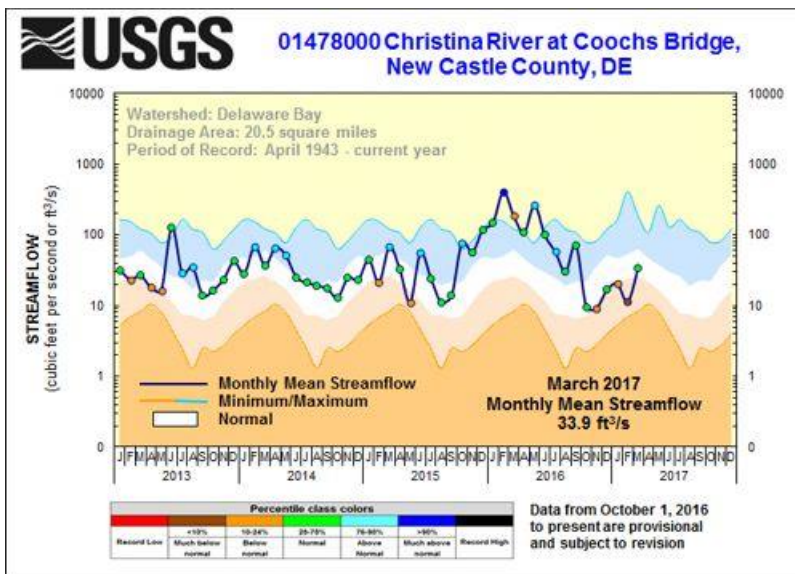
[http://md.water.usgs.gov/groundwater/web\\_wells/current/water\\_table/counties/](http://md.water.usgs.gov/groundwater/web_wells/current/water_table/counties/)

## U.S. Geological Survey (USGS) Maryland-Delaware-District of Columbia Monthly Water Conditions Summary

Hydrographs for two streamgages are presented below. The dark line in the 5-year hydrograph represents the monthly mean streamflow for this period, and the white band shows the normal range (25<sup>th</sup>-75<sup>th</sup> percentiles) based on the period of record. The maximum monthly mean streamflow is at the top of the blue shaded section, and the lowest monthly mean streamflow is at bottom of the tan area. Each monthly mean streamflow (each circle) is colored according to the percentile rank compared to the historical data for the month.



At Beaver Run near Finksburg, in Carroll County, Maryland, the monthly mean streamflow increased since February but remained below the 10<sup>th</sup> percentile at the end of March. March monthly mean streamflow was 12.0 cubic feet per second (ft³/s). The normal range is between 17.2 ft³/s and 34.4 ft³/s for March.



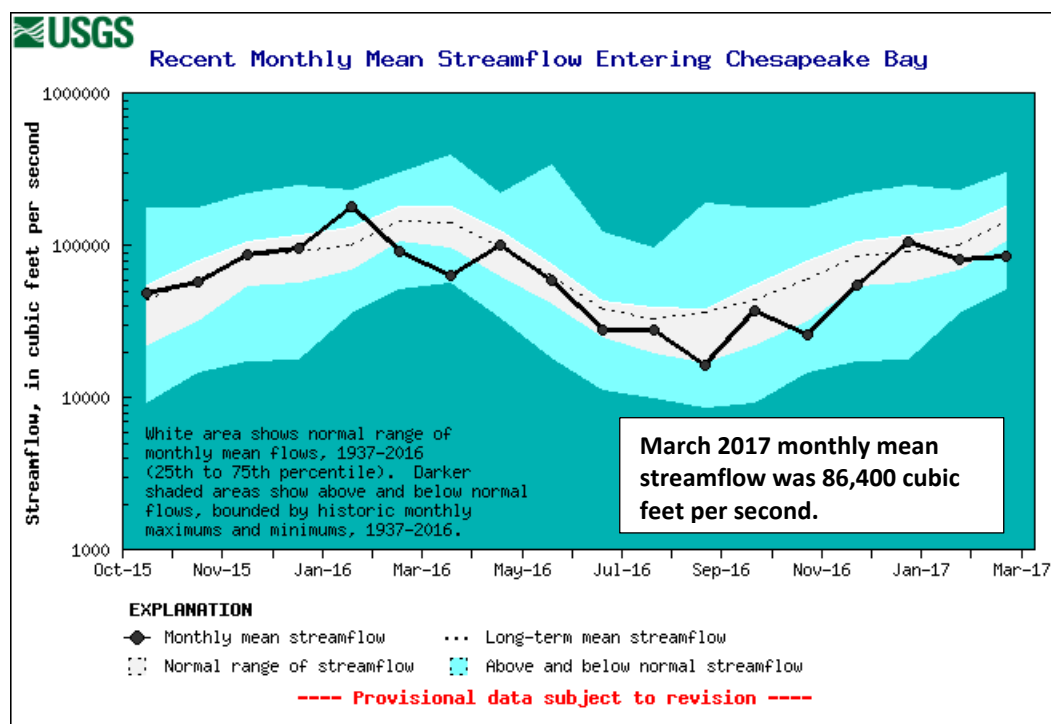
Streamflow on the Christina River at Coochs Bridge in Delaware increased since February, when it was below the 10<sup>th</sup> percentile. The March monthly mean streamflow was 33.9 ft³/s, which is in the normal range (between 26.8 ft³/s and 63.2 ft³/s).

Five-year hydrographs can be viewed at:  
<http://md.water.usgs.gov/surfacewater/streamflow/>

# U.S. Geological Survey (USGS) Maryland-Delaware-District of Columbia Monthly Water Conditions Summary

## Estimated Streamflow to the Chesapeake Bay

The estimated monthly mean streamflow entering Chesapeake Bay for March 2017 was 86,400 ft<sup>3</sup>/s. This value, which is provisional and subject to revision, is considered to be in the below normal range. Normal March streamflow entering the Bay is between 105,000 and 182,000 ft<sup>3</sup>/s, the 25th and 75th percentiles, respectively, of all March values. Average (mean) monthly streamflow for March is 146,000 ft<sup>3</sup>/s. These statistics are based on an 80-year period of record.



Runoff in the Chesapeake Bay watershed carries pollutants, such as nutrients and sediment, to rivers and streams that drain to the Bay. The amount of water flowing into the Chesapeake Bay from its tributaries has a direct impact on how much pollution is in the estuary, and it also affects the salinity levels that are important for the survival of fish, crabs, and oysters, with regard to the location and size of breeding/reproductive zones. Generally, as river flow increases, more nutrient and sediment pollution enters the Bay.

More information on freshwater flow to the Bay can be found here:

<http://md.water.usgs.gov/waterdata/chesinflow/>



# U.S. Geological Survey (USGS) Maryland-Delaware-District of Columbia Monthly Water Conditions Summary

## Baltimore and Patuxent Reservoir Levels

Baltimore City's Department of Public Works provides finished drinking water from three reservoirs (Loch Raven, Liberty, and Prettyboy) to 1.8 million people daily in Baltimore City and parts of Baltimore, Anne Arundel, and Howard Counties in Maryland. Carroll and Harford Counties also receive raw water from the Baltimore reservoirs. At the end of March 2017, available reservoir storage in the Baltimore Reservoirs was 70.37 billion gallons, or about 93 percent of available storage capacity (total or full storage is 75.85 billion gallons of water).

The Triadelphia and Duckett Reservoirs serve 1.8 million residents in parts of Charles, Howard, Montgomery, and Prince George's Counties in suburban Maryland around the District of Columbia, and are managed by the Washington Suburban Sanitary Commission (WSSC).

The stored water quantity at the end of March 2017 was 5.45 billion gallons, which is about 51 percent of normal storage capacity for the two Patuxent reservoirs. Normal storage refers to the volume that is useable for water supply. The full capacity of the two Patuxent reservoirs is 12.09 billion gallons, which is higher than normal storage (10.6 billion gallons), and therefore, full capacity values can exceed 100 percent of normal storage.

